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APPROPRIATIONS FOR 1939

The Act making appropriations for the Department of Agriculture for the fiscal year 1939, approved June 16, 1938, provides a total for the Bureau of Entomology and Plant Quarantine of $5,701,867. The amounts provided for the following items are less than those appropriated for the fiscal year 1938, as indicated:

Japanese Beetle Control.....	$30,000
Gypsy Moth and Brown-tail Moth Control..	$25,000
Dutch Elm Disease Eradication.....	$82,371
Insect Identification.....	$10,000
Insecticide and Fungicide Investigations	$25,000

The appropriation for Truck Crop and Garden Insect Investigations was increased by $80,000 to provide for the construction and equipment of a laboratory in North Carolina for the study of insect pests and plant diseases of tobacco. The appropriation for Insects Affecting Man and Animals was increased by $8,500 to provide for investigations on gnats at Clear Lake, Calif.

The Second Deficiency Act for the fiscal year 1938, approved June 25, 1938, included an appropriation of $700,000 for the Bureau of Entomology and Plant Quarantine under the authorization for the control of incipient and emergency outbreaks of insect pests and plant diseases. It also included an appropriation of $10,000 to provide for the expenses of a Mediterranean Fruitfly Board to be appointed by the Secretary under general authorization providing for the creation of a board of five members to carry on investigations and surveys on possible losses that may have been occasioned by the work of eradicating the Mediterranean fruitfly from Florida and report their findings to the Secretary of Agriculture.

FRUIT INSECT INVESTIGATIONS

New data on raisin moth females.--Records of Ephestia figulilella Greg., taken in a rotary net operated in a fig orchard at an elevation of 3 feet above the ground, from July to November 1937, show that the percentages of females steadily declined as the season advanced. Dwight F. Barnes, of the Fresno, Calif., laboratory, found that the percentages of females in the catches examined by him were as follows: July, 54; August, 43; September, 39; October, 27; November, 21. The percentages of females containing eggs, from examinations made beginning in September, were: September, 35; October, 27; November, 18. Although the percentages of females and of gravid females which were in the air at the elevation of the net may have differed from the proportion of females and gravid females in the population as a whole, the declining percentages probably reflect a general condition and point to a progressive weakening of the power of the species to reproduce.

Development of Japanese beetle larvae in Philadelphia area.--The Japanese beetle laboratory at Moorestown, N. J., reports that, at the close of May, development of the overwintering population of the Japanese beetle in the Philadelphia area appeared to be approximately normal for this time of year. Soil surveys conducted at a number of golf courses in the Philadelphia area indicated that approximately 6 percent of the soil population could be recognized as prepupae at the close of the month. Weather conditions during the first 4 months of the year were very favorable for the survival and development of overwintering larvae. Soil temperatures during the normally cold months of January and February, although below the threshold of development (50° F.), were from 2° to 6° above normal. Soil temperatures above normal also characterized March and April, so that by the end of April vegetation and presumably larval development were from 10 days to 2 weeks ahead of normal. Within the soil levels occupied by the greater part of the overwintering larvae (1 to 6 inches), temperatures generally reached 50° about March 20, whereas in 1937 this did not occur until approximately April 1. The month of May has been characterized by abnormally cloudy, cool weather, with soil temperatures ranging from 3° to 5° below normal, so that the rapid early season development has been to a large extent offset. The first field-collected pupa was recovered on May 25 in some laboratory plots, but at the regular survey stations no pupae were recovered in surveys made on May 31.

Colonization of Japanese beetle parasite.--At the Japanese beetle laboratory at Moorestown, notwithstanding the exceedingly unfavorable weather conditions during the normal collecting period, a sufficient number of females of Tiphia vernalis Rohw. were collected during May in the field to make up 316 colonies. Of these, 300 colonies were released in Maryland, 15 in Connecticut, and 1 in Pennsylvania.

Effect of hydrocyanic acid on Japanese beetle larvae.--At the Japanese beetle laboratory, Moorestown, W. E. Fleming and E. D. Burgess have completed 127 tests, using 300 larvae in each test, with hydrocyanic

acid at temperatures ranging from 45° to 100° F., with exposures of 0.5 to 3 hours and dosages of 2, 4, 6, and 8 ounces of hydrocyanic acid per 1,000 cubic feet. Previous work indicated that the third-instar larva of the Japanese beetle, removed from soil, was a satisfactory test insect to use in determining the exposure and dosage requirements at the different temperatures. As a result of this study, a schedule has been prepared for the fumigation of refrigerator cars with HCN at temperatures ranging from 45° to 75° F. at 5-degree intervals.

MEXICAN FRUITFLY CONTROL

Inspection results.--The annual tree-to-tree inspection of bearing citrus trees in the regulated area under Quarantine No. 64, was practically completed by the end of May. This inspection is for the purpose of removing all mature and off-bloom fruit that might serve as hosts during the host-free period. Only one infested fruit was found during this inspection. It came from a grove found infested late in the season. During the early part of May emergence from infested groves continued. Traps took 129 adults this month, all but 12 of these, however, being taken before May 15. The decrease this season is following the normal trend of previous years. The numbers of adults and larvae identified in May were as follows:

Species	Texas	Mexico
Adults	Number	Number
A. ludens Loew	129	34
A. serpentina Wied	4	1
A. sp. "Y"	1	0
A. pallens Coq	61	27
Total	195	62
Larvae		
A. ludens	5	2,886
A. nombinpraeoptins Sein	0	65
Total	5	2,951

CEREAL AND FORAGE INSECT INVESTIGATIONS

Early seasonal development of European corn borer in Lake States.--A. M. Vance, Toledo, Ohio, reports that pupation and emergence of the European corn borer in Ohio, Michigan, and Indiana were earlier in the spring of 1938 than in any previous year on record. The first pupa was found west of Toledo, Ohio, on May 4 and the first evidence of moth emergence was noted there on May 26. The earliest previous records of pupation and emergence in this area were on May 26 and June 12, respectively, in 1936. On May 11, 1938, 1 percent of the larvae had pupated in a cornfield examined in Allen County, Ind., and 2 percent had pupated on June 1 at Mt. Clemens, Mich., near Toledo, in fields believed to be largely infested by a second generation of the corn borer in 1937. Pupation in 1938 averaged 6 percent on May 12, 64 percent on May 26, and 84 percent on May 31 and in all cornfields examined the seasonal development of the insect was unusually

far advanced. The observed mortality of the corn borer in the Lake States this spring averaged only 2 percent.

Flight of June beetles (Phyllophaga spp.) in southern Wisconsin.--Messrs. T. R. Chamberlin, C. L. Fluke, Lee Seaton, and J. A. Callenbach, Madison, Wis., report that warm weather during April induced an early flight of June beetles, heavy flights occurring on April 25 and 26 in the vicinity of Madison. Cool weather thereafter reduced the flights to small proportions until May 18, after which large flights occurred frequently. In the districts between Darlington in Lafayette County and Linden in Iowa County, many bur oaks were stripped of their foliage, especially those in small, more or less isolated groves. Stripped oaks were more scattered throughout southwestern Wisconsin to some distance north of Madison. Doubtless such stripping also occurred in other areas not observed. The predominant species were Phyllophaga hirticula Knoch, P. rugosa Melsh., and P. fusca Froel. Flight of P. fusca began earlier in the season than that of the other two species. Thirteen additional species have been taken as follows: P. tristis F., P. prunina Lec., P. drakei Kby., P. ilicis Knoch, P. implicita Horn, P. nitida Lec., P. anxia Lec., P. futilis Lec., P. marginalis Lec., P. crenulata Froel., P. balia Say, P. inversa Horn, and P. spreta Horn. P. spreta and P. inversa were taken only at Gays Mills, Crawford County. P. prunina has been abundant in woods on the sandy hills near Lodi and Poynette, Columbia County.

Developmental status of the black grain stem sawfly in Ohio.--According to J. S. Houser and E. J. Udine, adults of Cephus tabidus F. are now (June 6) ovipositing in abundance in wheatfields in eastern Ohio. They were still numerous in both the old stubble fields and the growing wheat, and there are prospects for infestations comparable in intensity to those present in the past few years. The principal parasite (Pleurotropis benefica Gahan), which attacks this sawfly, has noticeably increased in numbers in the wheatfields examined near Youngstown.

JAPANESE BEETLE CONTROL

New sprayer-trailer unit in operation for Japanese beetle control.--Sleek and trim in its new paint, a compact semitrailer sprayer unit was driven away from the Bloomfield garage on May 9 to start its contribution toward the division's cooperative soil-treatment programs in Marietta and Ashtabula, Ohio. Designed by Donald E. Armstrong, of the control methods and development section of the division, in collaboration with E. G. Brewer, divisional head, the sprayer was constructed by mechanics of the division. Essentially, the trailer unit consists of a remodeled 1,000-gallon tank with a light-weight spray pump operated by a separate motor, all mounted on a reconstructed chassis from a condemned 3½-ton truck. The front part of the chassis was first stepped up to the required height for the fifth-wheel plate tractor attachment. In reconstructing the discarded 1,000-gallon tank for use on the trailer, it was first necessary to weld in a middle partition for the dual-tank arrangement, then to build a new bottom for the forward compartment to follow the lines of the stepped-up chassis. Instead of the center manholes in the tanks, these were moved to the side

by welding on a dornerlike side common to both tanks, so that the insecticide may be loaded in the tanks from the side. This resulted in a rear tank of 300-gallon capacity for lead arsenate spray and a 580-gallon forward tank for water used in washing in the spray mixture. In the rear of the tanks is mounted a light-weight standard spray pump, powered by a motor from a wrecked ½-ton truck. The power outfit is driven by gears, with the exception of the chain drive on the agitator. All motor controls, including a button self-starter, are located on a rear panel. The tractor, trailer, and equipment, including 2,000 feet of hose, nozzles, and supplies, weigh 10 tons. When both tanks are filled there is an additional load of 3-2/3 tons. A 5-ton tractor with dual tires in the rear is used in conjunction with this trailer. Vacuum-operated brakes on the trailer wheels are hooked up with the tractor brake system.

Southern trapping for Japanese beetle started.--Trap supervisors proceeded to Charleston, S. C., and Atlanta, Ga., during the month to start the trapping in the South. The supervisor at Charleston will work northward until trap setting is finally completed in New York, while the Atlanta supervisor will work westward as far as Chicago. Cooperative arrangements have been made with the States of Georgia and North Carolina for the furnishing of local labor to tend traps operated in sections where infestations have been found in previous years. Distribution of traps to the various field offices of the Bureau scattered throughout the United States continued during May. Reports at the end of the month showed that traps had been assembled and placed at the following number of field stations in the States listed: Alabama, 1; Arizona, 9; California, 7; Florida, 7; Georgia, 3; Louisiana, 3; Mississippi, 3; New Mexico, 4; North Carolina, 1; Tennessee, 1; and Texas, 30.

Spring soil-treating program for Japanese beetle control nears completion.--Applications of lead arsenate were concluded during May at the sites of the 1937 Japanese beetle infestations in Charlottesville, Va.; Marietta, Ohio; Erie, Pa.; and Rochester, N. Y. Only a few days were required to spray 4 acres in Charlottesville, where the work was finished on May 4. Treatments of 36 acres in Erie, in progress since April 25, were concluded on May 23; Rochester treatments, covering approximately 70 acres, were completed by May 26; and 5 acres were treated in Marietta, Ohio, between May 12 and 21. A newly constructed sprayer-trailer had its initial use on the Marietta job. At the conclusion of the spraying work in Marietta, the sprayer-trailer was driven to Ashtabula, Ohio, where 6.5 acres were treated between May 22 and June 3. Except for the soil-treating work still to be performed in Chicago, this concludes the treatments scheduled for this spring.

First reports of Japanese beetle emergence.--Earliest reports of Japanese beetle emergence were received from the Philadelphia district office. Two beetles were found on roses in a yard at Bristol, Pa., on May 26 and another was found on the ground in the Bristol Cemetery. Three beetles were collected from weeds near a greenhouse at Hatboro, Pa., on June 1.

Nursery scouting in lightly infested gypsy moth area.--Late in May larval scouting was started in the Connecticut nurseries that are authorized to ship under gypsy moth permit. Most of these nurseries are also classified under the Japanese beetle quarantine and ship under a certificate issued jointly under Quarantines 45 and 48. By the end of the month one gypsy moth larva had been found on a previously uninfested nursery in the Manchester, Conn., district. Larval scouting during June 1937 and rescouting of the premises for egg clusters last winter failed to disclose any infestation on these premises. Presence of this on the nursery is attributed to a severe windstorm from the east on May 15, which uprooted many trees in the vicinity and probably dispersed small caterpillars for some distance westward. All stock moved from the block in which the infestation was found will require inspection before removal to other parts of the nursery, to other dealers, or to nonregulated territory.

Cool weather lengthens New England nursery shipping season.--Considerable cool, rainy weather during May permitted New England nurseries to continue their shipping season throughout the entire month. The district inspector at Framingham, Mass., reports that nearly twice as many carloads of nursery stock have been shipped from one of the large nurseries in his district as moved in the spring of 1937. According to the district inspector at Westfield, Mass., one of the important nursery establishments in his district did 50 percent more business this spring than last. From the Boston, Mass., district it is reported that the largest amount of cut laurel ever certified from this market was inspected and sealed this spring. Most dealers in cut laurel report a larger volume of business this spring than for many years.

Gypsy moth egg clusters and larvae removed during inspections.--Since egg hatching was well under way in most of the infested area in May, few egg clusters were found on products presented for inspection and certification this month. One egg cluster was removed during the inspection of a carload of lumber being shipped from Deering Junction, Maine, to North Tonawanda, N. Y. One egg cluster and 25 larvae were removed from another carload inspected at Deering Junction prior to movement to North Jay, Maine, and 15 caterpillars were taken from a bundle of nursery stock inspected at East Boxford, Mass., for shipment to Guilford, Conn.

Gypsy moth hatching in Maine.--Early in May first hatches of gypsy moth egg clusters were observed in Maine at the following locations: Gray, May 5; Standish, May 9; Deering Junction, May 11; Burnham, May 13; and Fryeburg, May 15.

New townships added to Dutch elm disease infected area.--A devitalized tree in Delaware Township, Hunterdon County, N. J., sampled at the time of removal, was reported by the laboratory as infected on May 8. This tree was situated approximately 700 feet east of the Delaware River. This first-record case adds 37 square miles to the New Jersey zone of infection. Of 17 confirmations reported from New York during the week ended May 14, 1 diseased tree was located in Hamptonburgh, Orange County. This is a first-record infection for this town and adds 26.3 square miles to the infected

zone. This tree was approximately 2 miles west of a 1937 Blooming Grove confirmation and was located near the town of Girard. It was listed for removal as a decadent tree on an old unfinished work order issued to a C. C. C. camp in 1937, and was turned in as unfinished when the camp was abandoned in the fall of 1937. A large portion of the tree was blown down in a heavy windstorm in 1937, leaving only a large stub remaining. When the tree was destroyed on April 5, typical discoloration was found in a few of the suckers and in the live portion of the stump. Symptoms of the disease were found only in the 1937 annual ring. Old Scolytus multistriatus galleries were found in the trunk but all beetles had emerged when the tree was removed. Scouting for dead and dying trees around this point had been completed by May 21 and 49 devitalized trees and several piles of slash were tagged. Permissions for removal were soon obtained and the work was completed in the last 2 days of the monthly work period.

Dutch elm disease activities in Indianapolis.--Elm-sanitation work in the city was concluded about June 1. One crew of 5 men started systematic scouting there on May 25 in the Brightwood section. In 3½ days of scouting samples were collected from 73 elms. An additional case of Dutch elm disease was reported in the city late in the month. Hylurgopinus rufipes Eich. has been active in Indianapolis since the first of May. Well-developed egg galleries were found in elm slash on May 5. The fall canker-worm has defoliated many elms in the northern part of the Indianapolis work area. A few of the fall cankerworms were noticed in 1936. They were present but caused little defoliation in 1937. This year they are very abundant in certain areas. Second-growth elm foliage may be produced before scouting begins.

Transition from elm-sanitation activities to summer scouting.--Preparations for the summer scouting season were made throughout the infected States. Trucks and scouting equipment were overhauled and assigned. A new scout manual was also prepared to assist in the training of men for this work. Field activities of security wage workers were at a minimum after May 26, when most of the men completed their 15-day work period. There will be no more work of a general nature until the training school for summer scouts begins on June 6.

Early season wilting of elm foliage.--In New York elm foliage showing wilting characteristic of the Dutch elm disease was first noted in central and lower Westchester County on May 16. Little discoloration in the wood of the wilted trees was in evidence. On May 19 a tree was found in Harrison, Westchester County, with wilted water sprouts and showing definite discoloration. Severe wilting of that tree was apparent by May 28. Definite foliage wilting in New Jersey was first observed on May 20 in Somerset County. The earliest typical wilting seen in New Jersey in 1937 was at Green Village, Morris County, on May 30.

Power-saw units moved from swamp.--Clear-cutting operations for control of the Dutch elm disease by the power saw units in the Great Meadows section of Warren County, N. J., were discontinued at the end of May. A large quantity of wood remains to be piled and burned behind these units.

All clear-cutting work for which permissions have been obtained on the southeast side of the Pequest River is completed, except for this piling and burning.

Millionth culture plate for elm disease poured.--Report from the Morristown, N. J., research laboratory states that on Friday, May 13, the millionth petri dish of potato-dextrose agar was poured. The first culture plate for elm chips being tested for Dutch elm disease was poured at Morristown on June 5, 1934. During 1937 a total of 338,152 plates was poured.

Watch injected elm trees.--Observations of the 859 elms injected with zinc chloride by workers from this division were continued during the month by members of the staff of the Division of Forest Insect Investigations from the Morristown, N. J., laboratory. Last month's news notes reported in error that this work was performed in cooperation with the Division of Forest Pathology, Bureau of Plant Industry, at the Morristown laboratory.

FOREST INSECT INVESTIGATIONS

Survey of European spruce sawfly.--R. C. Brown, of the New Haven, Conn., laboratory, reports that plans are under way for surveying the important spruce areas of New England and New York, in cooperation with the States. One of the principal objectives of the survey is to determine the location of suitable infestations of Diprion polytomum (Htg.) for parasite liberations. P. B. Dowden will have immediate charge of the details of the survey.

European spruce sawfly emergence and parasite work.--Mr. Dowden reports that the first emergence of Diprion polytomum adults in the field was observed on May 4 at Mount Monadnock (Dublin, N. H.). Square-foot samples of duff were taken at Wilmington and Lincoln, Vt., on May 5 and 6 and the sawfly cocoons analyzed. Results from 15 samples at each locality are shown in the following table.

Locality	Diprion polytomum cocoons found				
	Previously emerged	Killed by predators	Dead	Living	Total
	Number	Number	Number	Number	Number
Wilmington	426	183	20	18	647
Lincoln	404	218	28	55	705

Reproduction work with Microplectron fuscipennis Zett. is progressing satisfactorily. Cocoons containing approximately 1,200,000 larvae of this parasite are being held at temperatures that will retard development until time for colonization. Some experiments are under way in attempting to rear Microcryptus sp., a cocoon parasite of D. polytomum received from the Canadian parasite laboratory at Belleville, Ontario.

Satin moth parasite liberated.--Mr. Dowden also reports that 351 puparia of Tachinonyia similis Will. reared from the satin moth were received from Olympia, Wash., in July 1937. They were hibernated at New Haven. Adult flies issued between April 30 and May 8. A total of 254 adults--130 males and 124 females--emerged. The flies mated well and a colony of 104 mated females was liberated at Waterbury, Conn., on May 12.

White pine weevil reclamation plots show results.--H. J. MacAloney, of the New Haven laboratory, reports that the white pine weevil reclamation plots at Petersham, Mass., were measured and notes on the condition of the pruned trees taken during the last week of May. The predictions made by A. C. Cline and Mr. MacAloney in the beginning of the experiment have materialized. The pruned trees are putting on satisfactory diameter growth and are straightening at the points where weeviling occurred. Practically all the girdled trees have died and are breaking down gradually, thereby acting as "trainers" to the pruned trees during the process of disintegration. The girdled trees which have not died have bridged at the point of girdling or are root-grafted with healthy trees. Additional pruning to make a clear log length of 16 feet and girdling a few more competing scrubby dominant trees is necessary this year. The maximum cost of $8 per acre for girdling, predicted during the earlier work, will not be exceeded. The pruning cost is a necessary management expense to obtain clear lumber and should not be considered as an entomological feature, whereas the girdling cost can be so considered.

Observations on two pine sawflies in the Northeast.--J. V. Schaffner, Jr., New Haven, reports as follows on two species of Neodiprion which have attracted attention in the Northeast during the last few years: "An extensive survey was made during May in the northern part of New Jersey, along the eastern border of Pennsylvania, and in southeastern New York, to determine the distribution of Neodiprion sertifer Geoff. Only a few definite recoveries were made outside the limits of infestation found in 1937. In Lamington and Far Hills, N. J., severe defoliation was noted on red, Scotch, Montana, jack, and Japanese red pines. On one estate in Lamington several hundred red pines, ranging from 5 to 15 feet in height, had practically all old foliage eaten and thousands of larvae were massed on the trunks and branches on May 24. The defoliation on the other pine ranged from about 50 to nearly 100 percent. The feeding on white pine, Austrian pine, and Japanese (black?) pine was very light, although these trees are growing in close proximity to heavily infested species. At Far Hills, N. J., some Pinus montana at the entrance to an estate had been defoliated (all old needles) both in 1937 and in 1938. This year nearly full-grown larvae were also found feeding on blue spruce and white pine near the defoliated P. montana. The indications are that the spruce and white pine are not favored but that larvae will feed on these species when grown in close proximity to favored species. In regard to the second species, Neodiprion sp., on red pine, observations in red pine plantations in Worcester and Middlesex Counties on May 5 and 6 indicated that hatching had taken place during the last week of April and the hatch approached 100 percent. In one plantation at Groton, Mass., with trees from 18 to 20 feet in height, counts showed an average of 13 tips per branch, with 3 tips per branch infested. In a natural stand of red pine reproduction, random counts on trees from 12 to 15 feet

high showed an average of nearly 7 tips per branch, with the infested tips averaging 1½ tips per branch. The larvae are gregarious and were found feeding on the tips near the eggs from which they had hatched. The infestation is rather heavy in these areas and many plantations are being sprayed."

Injections with enzyme from Matsucoccus scale produce typical injury.--T. J. Parr, New Haven, reports that in recent studies with Matsucoccus sp., salivary glands dissected out of first- and second-instar insects have been extracted in 30-percent glycerine, using an extraction time of 18 hours at room temperature. Fresh salivary secretion from six sets of glands extracted in 10 mm³ of 30-percent glycerine was injected on May 21 into the new growth on No. 1 pitch pine in the greenhouse. Five enzyme injections were made, with one check of 30-percent glycerine. Five more enzyme injections were made on another shoot of the same pine on May 24 with five check injections. In this case the checks consisted of three empty bulbs for mechanical injury and two glycerine-filled bulbs. On May 24, three of the five injections made on May 21 appeared to show "typical injury." No injury was apparent on the check. (By typical injury is meant a yellowing of the plant tissue on the surface of the new growth around the glass injection tube. This yellowing occurs not only laterally, where it might possibly be caused by compression of the plant tissue during injection, but also lengthwise of the stem, above and below the point of injury.) All five of the enzyme injections made on May 21 were showing "typical injury" on May 26. The glycerine check still showed nothing. On the same date two of the five enzyme injections made on May 24 appeared to be showing symptoms of typical injury. The checks--both dry-bulb and 30-percent glycerine-- showed no injury.

Concentrated spray mixture effective.--S. F. Potts, New Haven, reports that an examination of 100 of the 1,200 pines sprayed with a concentrated lead arsenate mixture at East Rutherford, N. J., for European pine shoot moth control, showed approximately 90-percent kill of overwintering larvae.

Autogiro uses concentrated spray mixture against sawfly.--R. R. Whitten, of the Morristown, N. J., laboratory, reports that in 1937 a serious infestation of an introduced pine sawfly (Acantholyda erythrocephala L.) was found in a large-stock nursery at Oakland, N. J. This infestation covered approximately 12 acres and occurred on Pinus strobus, P. resinosa, P. sylvestris, P. nigra, and P. densiflora ranging from 6 to 20 feet in height. By June 15 the larvae had completely devoured all the old needles on more than 80 percent of the P. resinosa. Control of this pest in 1938 by the application of an arsenical spray was considered, but it was found that with ordinary ground equipment it would be necessary to first cut several roads through the densely growing stand. It was therefore decided to attempt the job by means of an autogiro equipped to distribute a concentrated lead arsenate spray mixture. The formula for this mixture was as follows: 200 pounds powdered lead arsenate, 50 gallons water, 10 gallons fish oil, and 2½ gallons paraffin oil. The mixture was applied at the rate of 20 pounds of lead arsenate per acre, or approximately 10 gallons of

concentrated mixture per acre. The application was made early in the morning of June 1. The atmospheric conditions were very good, with no wind and considerable dew on the foliage. The atomization of the spray was excellent and the resulting coverage good, even on the lower branches of the more densely growing trees. At the time the spray was applied the majority of the larvae were about one-third grown. On June 3, 2 days after the spray was applied, a collection of 876 larvae was made by clipping infested terminals from all parts of the sprayed area. An examination of these revealed that 94 percent of the larvae had been killed. An examination of a few nearby infested pines, which had not been sprayed, showed that 93 percent of the larvae were alive and active. On a second visit to the sprayed area on June 6 an extensive survey revealed only an occasional living larva. Considerable spray deposit remained on the foliage after about 1 inch of rain. The spraying was done by a commercial firm. The Morristown laboratory cooperated with the New Jersey Department of Agriculture in recommending the mixture used and in checking the results.

Dutch elm disease areas in Indiana and Ohio examined.--W. C. Baker, of the Morristown laboratory, spent May 9 to 17 in Indianapolis, Ind., and May 18 to 21 in Athens, Ohio, making observations on bark beetles and borers attacking elm in the areas where the Dutch elm disease has been found to occur. He was assisted by members of the Dutch elm disease eradication unit. The native elm bark beetle (Hylurgopinus rufipes Eich.), previously found in both Indianapolis and Athens, was again found in material examined in both cities. The smaller European elm bark beetle (Scolytus multistriatus Marsh.) has not yet been found in Indianapolis but occurs in Athens. In the vicinity of Athens it was noted that the girdling of elm trees by farmers, a practice followed to eliminate them from farm and pasture lands, makes available a continuous supply of material suitable for the development of Scolytus. The species is therefore very abundant in that section. Several native coleopterous insects that attack elm were seen at both Indianapolis and Athens. The population of the elm borer (Saperda tridentata Oliv.) was extremely high in Indianapolis. Two other cerambycids, Physocnemum brevilineum (Say) and Neoclytus acuminatus (Fab.); two buprestids, Chrysobothris femorata (Oliv.) and Anthaxia viridifrons Gory; and two bark weevils, Magdalis armicollis Say and M. barbita Say, were common. A bostrichid, Xylobiops basillare (Say), was found in abundance at Athens in certain trees that were apparently in suitable condition for egg laying.

Chemical injections to kill elms tested further.--The Morristown, N. J., laboratory is cooperating with the Dutch elm disease eradication unit in an experiment to determine whether elm trees can be satisfactorily killed and subsequent bark beetle attack prevented by introducing zinc chloride solution into the tree trunks. The laboratory had previously tested the material on a small scale with promising results, and the present experiment is intended to determine whether it will prove satisfactory when used on a large scale to eliminate undesirable wild elms. Approximately 850 trees were treated in April while the trees were dormant, and about 500 additional trees were treated in May after the foliage had appeared. In April all trees were treated with 60 grams of zinc chloride per diameter-inch at breast height, using the chisel-kerf and rubber-collar method. The same

dosage was used on the trees treated in May but, while the chisel-kerf and rubber collar method was used on part of them, the turpentine hack-kerf and rubber-collar method was used on the remainder for purposes of comparison.

Ips infestation in Indian Reservation.--J. C. Evenden, of the forest insect laboratory, Coeur d'Alene, Idaho, reports that in 1936 and 1937 a rather severe killing of ponderosa pine by Ips oregoni Eich. occurred on Rocky Boy's Indian Reservation, Mont. This infestation developed in pine trees growing on submarginal lands and which had been weakened by a period of deficient precipitation. The method of logging practiced in connection with the operation of a small sawmill on the reservation was responsible for building the Ips population to a point where their attacks in these weakened trees became primary. During the last season an effort was made to conduct the logging operation in such a manner that the logs would be sawed prior to the emergence of the first Ips generation in the spring of the year. Unfortunately this plan was defeated through the burning of the sawmill the latter part of May, leaving approximately 20,000 board feet of ponderosa pine logs which were heavily infested with Ips. Mr. Evenden, who examined the area the first of June, recommended that the infested logs be rolled onto a peeling deck, have the bark removed, and then destroy the bark by burning.

Mountain pine beetle infestation, Coeur d'Alene National Forest.--Mr. Evenden also reports that the control project instituted in the fall of 1937 to combat a localized outbreak of the mountain pine beetle in white pine had to be discontinued in October, because of heavy snows, but that work was again undertaken about the middle of May. Because of extreme fire danger, the trees are being felled and the infested lengths peeled. Work is progressing nicely and will be completed by the middle of June.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth egg survival varies greatly.--Hatching of gypsy moth eggs was extremely variable this year, ranging from complete emergence to complete winter-kill. Eggs deposited in protected locations in areas where the temperature did not drop below -15° F. during the winter suffered very little mortality, while unprotected egg clusters in colder situations were partially or totally destroyed. All gypsy moth eggs are killed by a temperature of -25° and some mortality occurs at -15°. In years when a general cold wave sweeps over the infested territory gypsy moth infestation is greatly reduced, as practically all of the egg clusters not covered by snow or ice are killed. Conversely, a mild open winter is usually followed by a much heavier gypsy moth infestation. The last winter does not fall into either category. Relatively mild temperatures prevailed in many sections, while killing temperatures were recorded in others. Consequently, while the caterpillar emergence was above normal over most of the gypsy moth infested territory, the mortality was very heavy in some localities.

Retardation of foliage development delays spraying.--When unseasonably warm weather in April caused the early start of deciduous foliage development,

indications were that it might be possible to begin gypsy moth spraying earlier than June 1, the usual starting date in New England. However, the expansion of the foliage was practically halted by cold, stormy weather, accompanied by severe frosts in numerous restricted areas, during the second week in May. This was followed the next week by a general heavy frost throughout the infested areas in New England and eastern Pennsylvania, causing such serious damage to the foliage that much of it died and is being replaced by new foliage from the secondary buds. It was possible, however, to begin spraying in selected areas in Massachusetts on May 25 and at one location in Connecticut the next day. The selected areas contained no oak trees, the predominating growth consisting principally of gray birch, maple, and elm, all of which produce early foliage. Areas containing white oak, ash, hickory, and black birch will not be ready for spraying before June 1.

Preparations for gypsy moth spraying.--Gypsy moth scouting was curtailed in May in Massachusetts, Connecticut, New York, and Pennsylvania, as the major part of the working force was employed in preparing for spraying. Early in the month large quantities of supplies were moved from the storehouses in Greenfield, Mass., and Wilkes-Barre, Pa., to various points in the field central to the work, ready for distribution when needed. Thousands of feet of spray hose were transported to the areas to be sprayed and hose lines were laid, ready for immediate use. Sprayers were driven to their stations and made ready for work, tanks have been mounted on small trucks to serve the sprayers with gasoline, and two skilled shop mechanics were detailed to check up the pumps and make any necessary minor adjustments. A large force of W. P. A. workers was employed during the month in erecting barbed-wire fences around areas where spraying will be done, to prevent livestock from eating the poisoned foliage, and in preparing set-ups for the spraying apparatus near the water supplies. Progress in all branches of the work was satisfactory, and preparations were completed so that actual spraying could begin as planned. In addition to the preparations for spraying, the workers have applied great quantities of strip burlap to trees at infested locations in both the barrier zone and the Pennsylvania area. The burlap bands will be patrolled regularly and all caterpillars seeking shelter under them will be killed.

Storms provide water near areas to be sprayed.--The storms which caused considerable damage to tree growth during the latter part of May were not an unmixed evil, so far as gypsy moth work is concerned. The rains swelled small streams and filled water holes, which were nearly dried up a short time previously. In many cases this will assure a suitable convenient water supply, during a part of the spraying season at least, and enables the sprayers to be placed much closer to the areas to be sprayed than was anticipated.

Snow delays plant development in the Green Mountains.--While deciduous foliage had expanded sufficiently to permit gypsy moth spraying by the end of May in most of the infested territory in New England, the contrary was true in the mountainous sections of Vermont. All of the higher peaks in the Green Mountain Range were still covered with snow on May 21, and there was no indication of foliage development on deciduous growth, except on occasional small shrubs in particularly protected spots. There is always a considerable

lag in foliage development in this region, but this year the difference is especially marked.

Scouting work rushed in area soon to be flooded.--Gypsy moth scouting was recently resumed in woodland areas above the future high water mark surrounding the site of the Little Winooski River dam, located in the township of Waterbury in the northern part of the Vermont barrier zone area. Work in this section was discontinued in midwinter when deep snow rendered the roads impassable, but every effort is now being made to complete scouting in all areas above the level of the spillway before the water impounded within the flood-control reservoir floods sections of the roads now open for automobile travel.

Many young white pines killed by gypsy moth.--A gypsy moth official recently inspected an area in the Milton-Canton section of Boston that was severely defoliated by the gypsy moth last year. There was formerly a fine understory of white pine over a large part of the area, but most of it is now either dead or dying as the result of a single complete gypsy moth defoliation. Some of the trees have produced a few small clusters of new needles but in many cases the terminals are dead and the bark withered, indicating that they have little chance to survive.

Gypsy moth spraying in Pennsylvania.--The securing of spraying permits in residential sections of the gypsy moth infested area in Pennsylvania was completed during the first part of May. Only 18 of a total of 1,588 property owners refused to sign the standard form of permit, and the few who refused permission were served with notices by an official of the bureau of plant industry of the Pennsylvania Department of Agriculture under authority granted in the Pennsylvania Plant Pest Act of 1937, so that the premises could be treated in their proper order. Spraying of residential districts in the Susquehanna and Lackawanna River Valleys was begun on May 16. Infestation conditions in these residential areas have improved to such an extent that only 10 sprayers are needed this year, while 28 were required a year ago. The spraying schedule is so arranged that the work should be completed in the towns and villages by the time that the foliage in the woodlands becomes large enough to hold the poison efficiently.

Black flies force suspension of scouting.--Multitudes of small black flies attacked gypsy moth scouts in some sections of the Pennsylvania infested area on May 3 to such an extent that scouting became impossible. Several lotions sold as repellents were tried but none proved satisfactory and the eyes and lips of many of the men were badly swollen from insect bites before work was discontinued for the day.

Tree banding and patrolling chief occupation of C. C. C. gypsy moth crews during May.--Banding trees with strips of burlap became the chief occupation of C. C. C. enrollees in gypsy moth work during May. By May 14 over 170,000 trees had been burlapped in Massachusetts and Connecticut. As the season was not as far advanced in Vermont, the enrollees in that section were employed during this period in preparing areas for burlapping. Later in the month patrolling the bands and killing all caterpillars found seeking shelter under the burlap occupied most of their time.

Tent caterpillars abundant in Massachusetts and Vermont.--Observations made during the first week in May by C. C. C. enrollees engaged in gypsy moth work in Massachusetts and Vermont disclosed heavy infestations of forest tent caterpillars in those States, where they have been abundant for about 3 years. The eastern tent caterpillar is also plentiful, as has been the case for several years. Many trees were completely defoliated.

PLANT DISEASE CONTROL

Barberry-eradication force expanded in Wisconsin.--On May 16 the barberry-eradication field force in Wisconsin was increased from 121 men working in 7 counties to 275 men working in 11 counties. These additional men reported for work during the first 3 days of the second pay period in the month, thus making it possible for the State leader and his assistants to give the supervisors a maximum amount of assistance in training and starting the men to work. No difficulty was experienced in obtaining a sufficient number of experienced foremen to provide adequate supervision at places where it was most desirable that survey work be undertaken. The 154 men added to the field force were obtained in 4 counties. The entire force is now working out of 11 field headquarters with an average of 25 men in each place. Present field work is conducted with two points in view--work in areas of escaped barberries and survey to finish counties where work has been in constant progress since the emergency program started in 1933. Area survey now being done is a resurvey of infested territories that were last inspected in 1933 or 1934. Considerable progress has been made with intensive survey in the southern half of Wisconsin since the spring of 1933. Every known area of escaped barberries has been worked once and other infested areas have been found and eradicated. The records show that 25 counties have been completed by the intensive survey method and 14 others have received varying amounts of survey. There is a comparatively small amount of work yet to be done in 6 of these 14 counties, and it should be possible to finish them in 1938 if a sizable program can be continued throughout the season.

More than two million barberries already destroyed in Virginia this year.--During the first 4 months of the present year 2,782,485 native barberry bushes were destroyed on 82 properties in southwestern Virginia, by the use of 151 tons of salt. In April some resurvey work was conducted in two counties and 14,835 sprouting barberry bushes were destroyed. Inspection of large areas where salt brine was used last summer and fall indicates that brine can be used very effectively in actual eradication field practice. Good kills were secured by the application of 80 pounds of evaporated salt per square rod. Preliminary observations indicate that the use of salt brine was more effective if applied when the soil was dry. Squads of laborers began the first eradication work in Russell and Botetourt Counties on May 16 at the urgent request of the county agents and farmers, and 31 men are now employed in these two counties. The cooperation received in these counties has been excellent. In Russell County one farmer donated the use of his 1½-ton truck with a driver for 6 hours to assist in unloading a 40-ton car of salt. The use of entire houses, barns, sheds, and other buildings has been donated for storing salt. In some cases even locks and keys have also been furnished.

"Lost species" of Ribes found in California.--A most interesting discovery was made on May 20, 1938, by T. H. Harris and F. A. Patty, of the Oakland blister rust control office, of Ribes tularensis, a species of Ribes which has been lost for some 30 years. These Ribes bushes, first thought to be R. binominatum, but later determined by C. R. Quick, of the Berkeley blister rust office, as R. tularensis, were found growing in abundance on an area of about 500 acres in the Sequoia National Park in the vicinity of Rejoicing Summit, a locality on the southwestern edge of Giant Forest, in Tulare County, Calif. The Ribes were fairly widespread in a dense forest consisting mainly of white fir and sugar pine, on northerly and easterly slopes at an estimated altitude of 5,500 feet. The species was not encountered in other localities visited by Messrs. Harris and Patty in their inspection of various areas within the park. Ribes tularensis had previously been known from a single collection made in the Giant Forest in August 1905 by Katharine Brandegee and described by Dr. Coville in 1908 in North American Flora (v. 22, part 3, p. 218). The species seemed then to have disappeared from this locality, as the Giant Forest has been carefully inspected by competent botanists without finding it. The type specimen, and presumably the only specimen, of Grossularia tularensis Cov. is supposed to be in the herbarium of the University of California. On an index sheet, without a specimen, filed with the rest of the Ribes material on floor 3 (family 118) of the herbarium, is an identification label reading as follows: "Herbarium of the Univ. of Calif. Grossularia tularensis Coville. The type sheet or its representative is filed in the type collection on sheet No. 79,592." In a small pocket on this index sheet, are two slips of paper, one a regular specimen-identification slip, reads: "Flora of California. Ribes Giant Forest, Tulare County, Katharine Brandegee, August 1905." On the second slip, the following is written, apparently in the same hand as that on the identification label: "The type is the only plant in existence, was collected by Mrs. Brandegee in the Giant Forest, Aug. Passed over to Dr. Rose, who had a photograph made of it. This and a leaf are in the U. S. National Herbarium. This information is on the type sheet in the type case."

White pine infection study plot established.--An infection study plot of 3.8 square chains was established near Loudonville, Ohio, the latter part of April by E. E. Honey, of the Milwaukee, Wis., regional office. This study plot shows that 1.6 percent of the trees on the plot were infected from 1930 to 1934. The highest percentage of infection occurred in 1932. Apparently all of the visible cankers developed before the first Ribes eradication, which was performed on August 31 and September 3 and 4, 1934. Records show that approximately 250 R. cynosbati per acre were pulled by C. C. C. crews at that time. A second working performed on April 4 and 5, 1938, resulted in the removal of approximately 68 bushes per acre. These were much smaller than those found on the first eradication.

Blister rust control work in Saratoga County, N. Y.--The Board of Supervisors of Saratoga County, N. Y., recently appropriated $6,000 for blister rust control work. The men that are to be employed on the project will be taken from among those not eligible for W. P. A. relief but who need assistance. Employment will be given to about 25 men during the period from May 15 to September 30, and their efforts will be confined chiefly to initial control work, since 26,000 acres in this county have not as yet been protected.

Newly infected county reported from Ohio.--Blister rust infection was found by State leader O. J. Dowd on white pine in Holmes County on May 11. This is the first time blister rust has been found in this county.

Field work begun in western white pine region.--Field operations have gotten off to a good start in the western white pine region of Idaho, Washington, and Montana. Camps have been established by both the Bureau and the Forest Service. Labor turnover has been very light and the quality of labor measures considerably higher, as compared to that of recent years. Inspection of Ribes eradication showed exceptionally efficient work, which would compare favorably with that of select crews. Field conditions have been good for early season work as the Ribes were in full leaf and the foliage on associated brush is much slower in coming out. Chemical work was started on the Clearwater National Forest about the first of June, whereas in former years it was not begun until late in June or early in July. A large amount of mop-up work will be done this season in stream-type; also, cut-over areas reproducing to white pine will be reworked where sufficient Ribes have come back to cause additional infection. Temporary personnel paid from W. P. A. allotments totaled $94 for May.

COTTON INSECT INVESTIGATIONS

Damage to cotton by hemipterous insects in Puerto Rico.--In order to determine the amount of damage caused by the boll-feeding group of hemipterous insects, 8,088 mature green bolls were examined from 78 fields by L. C. Fife, of the Mayaguez, P. R., laboratory, throughout the cotton-growing districts during 1935, 1936, and 1937. The injured bolls per field averaged 20.1 percent, ranging from 0 to 82 percent. On one occasion the numbers of injured bolls and locks were recorded separately. Of 900 bolls examined, the percentage of injured bolls ranged from 6 to 30, averaging 16.6 percent, and the percentage of injured locks ranged from 3 to 19, averaging 9 percent. Most of the damage was probably caused by the following pyrrochorids and pentatomids, as they were found to be rather abundant in the fields: Dysdercus sanguinarius Stal., Dysdercus andreae L., Nezara viridula L., Acrosternum marginatum P. B., Thyanta perditor F., Podisus sagitta F., Piezodorus guildinii Westw., and Mormidea cubrosa Dallas.

Bollworm on cotton in Puerto Rico.--Mr. Fife reports that during the 2½ years in which he was stationed in Puerto Rico the bollworm (Heliothis obsoleta (F.)) was never observed to attack Sea Island cotton. Corn is usually heavily infested and Heliothis is one of the most serious pests of this crop in Puerto Rico. The bollworm attacks Sea Island as readily as short-staple cotton in the continental United States. Heliothis virescens (F.) was occasionally found attacking cotton in Puerto Rico.

Pink bollworm emergence.--The number of pink bollworm moths emerging during May from overwintered larvae was considerably less than last year, according to reports from A. J. Chapman and H. S. Cavitt, of Presidio, Tex. Of the approximately 40,000 larvae in cotton bolls used in the experiments to determine the survival under different conditions, only 7.2 percent had emerged by the end of the month, as compared with 10.4 percent under comparable

conditions last year. In the cages in which winter irrigations were applied following winter burial there was 5.4 percent emergence, whereas 10.3 percent had emerged in the cages in which winter burial was not followed by a winter irrigation. The earlier in the winter the bolls containing the larvae were buried and irrigated, the lower the emergence; and the earlier in the winter the bolls were buried but not irrigated, the higher the emergence. In the series of cages installed to determine the effects of the time of a spring irrigation on the time of emergence, there was a much earlier emergence from cages watered on March 10 than from the cages not irrigated until April. It was again noted this year that where irrigation was delayed until April 20 most of the emergence occurred over a very short period while in the cages that did not receive a spring irrigation the emergence was strung out over a considerable period. There has been little difference in the emergence thus far from the cages in which the bolls were buried 6 inches and cultivated to a depth of two-thirds inch following the March 15 irrigation and from cages with similar treatment except that they were not cultivated. The emergence from larvae that left the bolls and spun cocoons in the ground has averaged 0.43 percent, as compared to an average of 7.21 percent of larvae in bolls receiving similar treatment. These results are in agreement with those obtained last year and indicate that larvae leaving the bolls and spinning up in the soil may not be as important in the pink bollworm carry-over as had been thought.

Pink bollworm parasites.--One generation of Microbracon nigrorufum Cush. has been reared on Ephestia larvae from the adults received from Japan last month by L. W. Noble at the Presidio, Tex., laboratory. The results of rearing on this host were disappointing, as a high percentage of the parasite larvae died before spinning cocoons and over 60 percent of those that spun cocoons did not complete development. Most of this mortality seems to have been caused by decay among the host larvae and it is thought that the percentage of development can be increased by frequent transfers from hosts beginning to decay. The present rearing technique will have to be improved before it can be adapted to large-scale rearing. An examination of over 700 adults of Chelonus blackburni Cameron to determine the sex was made. Only females were again found and no males have been found in any of the material reared in the Presidio laboratory. During the last several months adults of this species have not lived as long as formerly, possibly because of prolonged breeding under artificial conditions.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

The 1938 crop.--The new cotton crop in the lower Rio Grande Valley of Texas has continued to make excellent progress. The first bale of the season was ginned on May 31, this being the second earliest bale in the history of the valley. Considerable cotton is beginning to open in the dryland section but it will be several weeks before there is much ginning. In the Matamoros section of Mexico, which is opposite the lower Rio Grande Valley of Texas, the cotton crop is also making good progress. At the request of the Mexican inspector in charge of that district, inspectors of this project have accompanied him from time to time on inspection trips in

his district. On May 12, while inspecting blooms in a field 2 miles northwest of Matamoros, one pink bollworm larva was found and on May 15 four additional larvae were found in another field 4 miles northwest of Matamoros. Following these findings in Mexico, some field inspection has been done on the American side but with negative results. In the remaining districts of the regulated area the cotton crop is making satisfactory progress.

Stub cotton.--As mentioned in the last News Letter practically all of the stub cotton in the regulated area of Arizona was killed by cold weather. In the Big Bend area of Texas stub cotton continued to grow and put on considerable fruit during May. Much of the cotton was destroyed while crops were being cultivated, but there are several abandoned fields that contain a good deal of this type of cotton. Inspections have been made throughout the month and it has been fairly easy to find specimens of the pink bollworm. The stub cotton has not been watered in the abandoned fields and indications were that it would soon stop fruiting. The field cotton, however, was putting on considerable fruit by the end of the month and inspections will be made next month.

Laboratory inspection.--The Thurberia bolls collected from various mountain ranges in southeastern Arizona have all been inspected. The results were negative so far as the pink bollworm is concerned; however, a considerable number of Thurberia weevils were found. At the San Antonio laboratory green-boll samples collected outside regulated areas have been inspected with negative results. Green bolls collected within the regulated area have been inspected at field stations and a few specimens of the pink bollworm were found in counties where infestation had already been established.

Thurberia-plant eradication.--Approximately 68 laborers have been employed under this activity during May. They worked in the Santa Catalina Mountains of southern Arizona, covering 2,520 acres and locating and destroying 19,336 Thurberia plants. Most of these plants were heavily infested with Thurberia weevil. It is estimated that work can be carried on from the present camp until the first of September. There are some rather large colonies of plants on the western slopes of this range but the weather has been exceptionally dry and it has not been practical to establish a camp there. An adequate water supply is available at the present camp from a well on a ranch.

Wild-cotton eradication.--Excellent progress was made with the eradication of wild cotton in southern Florida throughout May. There was considerable rainfall in some sections but very little time was lost. On the upper west coast a third recleaning for this season is nearing completion. In the Ten Thousand Islands section a second cleaning was in progress. This crew located and destroyed two virgin colonies covering some 18 acres and containing 311 mature and 230 seedling plants. A second cleaning has been completed on the mainland keys. During the month approximately 3,400 acres were covered, from which 17,838 seedling and 17 sprout plants were removed. It is of interest to note that only 330 of the plants contained bolls. In connection with the third recleaning on the west coast, a considerable amount of scouting has been done near known colonies and also in other locations favorable for wild cotton. Plantings of Sea Island cotton now extend southward

to a point east of Tampa, which means that such plantings occur intermittently from close to the wild cotton area all the way to the main Cotton Belt. It is therefore very important to be absolutely sure that no wild cotton is overlooked and allowed to produce fruit, especially along the upper west coast. Some 350 wild cotton bolls were inspected as plants were being destroyed in the Bradenton section. This is the most northern section on the west coast where wild cotton occurs, and it is especially gratifying to report that results were negative.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Paradichlorobenzene as a fumigant for sweetpotato weevil.--Reporting on a survey to determine the results of fumigation of seed sweetpotatoes with paradichlorobenzene in storage houses, bins, and banks, as a means of combating Cylas formicarius (F.), K. L. Cockerham, of the Sunset, La., laboratory, says that general conclusions indicate definitely that wherever the fumigation with paradichlorobenzene was performed properly the results were satisfactory, but in instances where the recommended methods were not followed results were unsatisfactory. It was found that most of the farmers did not construct fumigatoria properly with particular reference to rendering them air-tight, failed to use the proper dosage of the fumigant, or failed to make the proper prefumigation preparations.

Insecticide tests against pea weevil.--Laboratory tests against Bruchus pisorum (L.) by T. A. Brindley and his associates of the Moscow, Idaho, laboratory, gave the following indicative results: (1) Distinct differences were shown to exist between the mortality obtained with dust mixtures containing 1.0, 0.75, and 0.50 percent rotenone, respectively. Much less difference was noted in the toxicity of dusts containing 1.0 percent and 0.75 percent than between those containing 0.75 percent and 0.50 percent of this ingredient. (2) A cube dust mixture with diatomaceous earth as a carrier did not give as high a mortality as cube with talc as a carrier. (3) The addition of 2.0 percent peanut oil, 1.0 percent sodium oleyl sulphate, and 0.5 percent water to cube in talc did not increase its toxicity. (4) A dust containing 0.005 percent sulphur nitride was nontoxic to the weevils. (5) The addition of 0.225 percent pyrethrins to a cube dust in talc, containing 0.50 percent rotenone, markedly increased the toxicity of the dust. (6) Additional data were accumulated to indicate that at least a part of the toxic effect of dusts containing rotenone to the pea weevil is due to its contact properties.

Paris green-sulphur dust mixture controls flea beetles on sugar beets.--H. E. Dorst, of the Logan, Utah, laboratory, reports that recent experiments in the control of flea beetles attacking sugar beets in Utah indicated that a paris green-sulphur dust mixture (7.5 - 92.5) was effective against these pests. A 94-percent control was observed 72 hours after application and a 61-percent control was recorded after 3 days of intermittent precipitation. Experiments in the control of the flea beetles with sprays indicated that a spray composed of 1 pound of sulphur and 7 pounds of paris green per 100 gallons of water gave a 71-percent control after the expiration of 48 hours. The flea beetle population consisted principally of the hop flea beetle (Psylliodes punctulata Melsh.).

Observations on pea weevil migrations.--J. C. Chamberlin, of the Corvallis, Oreg., laboratory, reports that in the course of studies on the migration of the pea weevil in Oregon this spring, it was determined that a light initial movement occurred during the period April 28-30 into sparsely blooming fall-planted Canadian field peas. Another light flight was recorded on May 5-7 and a relatively large flight occurred during the period of warm weather from May 12 to 16. This flight was succeeded within a few days by the main migration of the season, which started May 18, reached its peak on the 19th and 20th, and ended on May 26. As based on trap records, the relative magnitude of the three last flights was as follows: May 5-7, 0.7 percent; May 12-16, 10.4 percent; May 18-26, 88.9 percent.

Insecticide tests promise control of striped cucumber beetle.--In preliminary tests directed against Diabrotica vittata (F.), excellent control was obtained by N. F. Howard of the Columbus, Ohio, laboratory, with a dust mixture containing 0.4 percent rotenone with talc as a diluent. Applications of the undiluted finely ground root of the gourd Cucurbita foetidissima H. B. K. supplied by R. E. Campbell, of the Alhambra, Calif., laboratory, were not as effective against the cucumber beetle as the dust mixtures containing derris, but showed some possibilities. The derris-dust mixture was effective for several days and exhibited considerable protection from D. vittata for 6 and 10 days after application, even though heavy rains occurred and the plants made rapid growth. Indications from these experiments were that in commercial practice the derris-dust mixture should be applied every few days. Tests with mixtures containing sulphur nitride-talc (25-75) and sulphur nitride-talc equal parts, indicated that this material is toxic to the cucumber beetle. A number of dead beetles were found 24 hours after the treatment. Although no comparable applications of derris were made in this experiment, it appeared on the basis of these tests that sulphur nitride is not as effective as a derris-talc dust mixture containing 0.4 percent rotenone.

Parasitization of whiteflies on tomatoes in greenhouse.--C. A. Weigel, of the Beltsville, Md., laboratory, reports that recent observations indicated a parasitization of 89.4 percent of the greenhouse whitefly (Trialeurodes vaporariorum (Westw.)) by the hymenopterous parasite Encarsia formosa Gahan on greenhouse-grown tomatoes. Although it appeared that the host insect was held in complete control by this parasite, the latter was slow in developing the needed balance of biological control, therefore the plants were appreciably weakened by the attack of the whitefly. There are a number of accounts published in English literature on the control of T. vaporariorum by this parasite.

Beet leafhopper survives winter in Montana.--J. R. Douglass and F. H. Harries, of the Twin Falls, Idaho, laboratory, report that a survey of the Billings, Mont., district on May 2-3 resulted in finding 14 living adults of the beet leafhopper, indicating that during certain winters this insect is able to survive in the area surveyed.

INSECTS AFFECTING MAN AND ANIMALS

Equine encephalomyelitis cases appear.--In May a few scattered cases of this disease in the Central States were reported, apparently its first occurrence in the United States this season. Last year an epizootic of the malady affected some 60,000 to 70,000 horses in the Middle West, Southwest, South, and West, with a death loss estimated at 46,000 animals. Mosquitoes are the only known vectors of the disease, although it seems probable that other insects and ticks may be involved.

Tick paralysis of dogs.--During the past month several cases of paralysis of dogs apparently caused by the American dog tick (Dermacentor variabilis (Say)) have been reported to the Bureau from various parts of the United States. This Division is much interested in obtaining as much information as possible on the distribution of the disease and on the species of ticks responsible for it in different sections of the country. The Washington office will be glad to have information on any cases that might come to the attention of Bureau employees and to receive preserved specimens of ticks collected from afflicted animals.

Insect-borne disease of turkeys indicated to be widespread in Southeast.--A blood parasite, Leucocytozoon smithi Laveran and Lucet, has been found by B. V. Travis to be present in a fairly large percentage of the domestic turkeys of Alabama, Georgia, Florida, and South Carolina. In certain sections of the country the parasite is carried by buffalo gnats, but whether this is the insect vector in the Southeast has not yet been determined. Farmers report that the disease is responsible for killing as high as 50 percent of their young birds in some years. The disease also occurs in wild turkeys, but the percentage of affected birds has not been determined. Occurrence of the disease has been reported previously from South Dakota, Nebraska, and Minnesota and is thought to occur in Virginia.

FOREIGN PLANT QUARANTINES

Orchid diseases intercepted.--Determinations have been received from Miss E. K. Cash for a number of diseases of orchids intercepted at San Francisco from November 26, 1937, to May 6 of this year and one interception at Brownsville, Tex., on April 24, 1938. The pathogens include Colletotrichum macrosporum Sacc. on Cypripedium haynaldianum from the Philippines; C. orchidearum All. on Cattleya labiata from Brazil, Cattleya sp. from Colombia, Oncidium ampliatum from Canal Zone, O. cavendishianum and O. splendidum from Guatemala, Oncidium sp. from Colombia, Phalaenopsis amabilis (2), P. aphrodite (4), P. grandiflora and P. schilleriana (2) from the Philippines, Stanhopea wardii from Guatemala, and an undetermined orchid from Mexico; Colletotrichum sp. on Cymbidium lowianum from Siam; Coniothyrium sp. on Dendrobium nobile cuttings from Japan; Dendrodochium cattleyae All. on Cattleya sp. from Colombia; Gloeosporium affine Sacc. on Phalaenopsis amabilis (4), P. grandiflora, P. schilleriana (2), and Vanda sanderiana from the Philippines, on Saccolabium giganteum illustre and Vanda coerulea from Siam, and on Schomburgkia loudemannii from Canal Zone; G. bidgoodii Cke. on Odontoglossum harryanum from Colombia; G. cattleyae Sacc. & D. Sacc. on Cattleya sp. from Colombia;

G. cinctum B. & C. on Cymbidium lowii from Siam, Dendrobium taurinum from the Philippines, and Epidendrum stanfordianum from Canal Zone; G. dendrobii Maubl. on Dendrobium nobile cuttings from Japan; G. oncidii Oud. on Oncidium bicallosum from Guatemala, O. crispum from Brazil, O. leucochilum and Oncidium sp. from Guatemala; G. orchidearum on Oncidium flexuosum from Brazil; Gloeosporium sp. on Cymbidium eburneum from India, C. lowii from Siam, and Oncidium sp. from Mexico; Macrophoma oncidii P. Henn. on Oncidium ampliatum from Canal Zone, O. longipes from Brazil, Phalaenopsis schilleriana from the Philippines, and Schonburgkia leudemannii from Canal Zone; M. orchidicola (Speg.) Sacc. & Syd. on Stanhopea wardii from Guatemala; Ophiobolus sp. (no species of the genus reported on orchids) on Oncidium cavendishianum from Guatemala; Pestalozzia sp. (not any of the spp. described on orchids) on Oncidium bicallosum and Stanhopea wardii from Guatemala; Phomopsis sp. on Stanhopea wardii (2) from Guatemala; Phyllosticta sp. (P. laeliae Keissl.? with small spores) on Oncidium ornithorhynchum from Guatemala; Phyllosticta sp. (unlike any species reported on orchids) on Laelia sp. (L. albida ?) from Mexico; Phyllosticta sp. on Phalaenopsis amabilis from the Philippines and on Stanhopea wardii from Guatemala; Physalospora orchidearum P. Henn. on Cymbidium eburneum from India, C. lowianum from Siam, Oncidium cavendishianum from Guatemala, Oncidium sp. from Mexico, Phalaenopsis amabilis, P. aphrodite, and P. grandiflora from the Philippines; Vermicularia sp. (V. geayana Del. ?) on Cymbidium virens swensis from Japan; and Volutella albido-pila Boud. on Phalaenopsis sp. from the Philippines.

Scolytid in rooted cutting of fig.--Two living adults of Hypoborus ficus Er. were intercepted at New York on January 19 in a rooted cutting of fig in passenger's baggage from Italy. M. W. Blackman reports as follows on this scolytid: "Hypoborus ficus Er. is largely confined to the Mediterranean region in southern Europe, northern Africa, and Asia Minor. It is of some economic importance, but the degree of importance is judged differently by different writers. It probably is comparable economically to Scolytus rugulosus Ratz., which usually confines its attacks to moribund or decadent bark. Decadent bark of fig is the favorite breeding place of H. ficus. It is not known to be established in this country, although it would not be surprising if it has become established through imported fig planting stock."

Entomological interceptions of interest.--A living larva of the fruitfly Anastrepha nombinpraeoptans Sein was intercepted at Baltimore, Md., on January 24 in a mango in ship's quarters from Haiti. Three living larvae of the Mediterranean fruitfly (Ceratitis capitata Wd.) were intercepted at New York on October 29, 1937, in a pomegranate in unaccompanied baggage from Greece. Four living larvae of the turnip gall weevil (Ceutorhynchus pleurostigma Marsh.) arrived at Philadelphia on January 22 in turnips in ship's stores from Belgium. Living specimens of the mirid Mertila malayensis Dist. were taken at San Francisco on March 24 on an orchid (Renanthera storiei) in the mail from the Philippines. A larva of the European corn borer (Pyrausta nubilalis Hbn.) was found at Chicago, Ill., on April 7 in a corncob in the mail from Yugoslavia. Five living adults of Bruchus tristis Boh. were intercepted at Boston on March 1 in dried peas in the

mail from Italy. A living specimen of Lygaeus pulchellus F. was found at Nogales, Ariz., on January 1 on a bell pepper in cargo from Mexico. Living workers of the ant Iridomyrmex melleus Whlr. arrived at Honolulu, Hawaii, on September 8, 1937, on orchids in express from France. Three living adults of the coleopteron Discoloma vestitum Pasc. were taken at New Orleans on November 18, 1937, under the bark of a primavera (Tabebuia donnell-smithii) log in cargo from Mexico. A living specimen of the cicadellid Graphocephala rufimargo Walk. was intercepted at Brownsville, Tex., on December 6, 1937, in a Shasta daisy (Chrysanthemum maximum) in baggage from Mexico. The mealybug Pseudococcus theaecola (Green) was intercepted at Washington, D. C., on January 21 on rhizomes of Hedychium gardnerianum in the mail from India.

Pathological interceptions of interest.--Aphelenchoides bicaudatus Imanura and Hexatylus n. sp. were intercepted on ginger root from China on April 16 at Boston; Bacterium citri (Hasse) Doidge on lemon from Singapore at Boston on May 13; Colletotrichum graminicolum (Ces.) Wils. on grass from Ethiopia on May 9 at New York; Cronartium sp., probably C. quercuum (Berk.) Miy., on Pinus densiflora from Japan on December 22, 1937, at Boston; Fabraea maculata Atk., first interception, on quince fruit from South Africa; Fusicladium depressum (B. & Br.) Sacc., with spores shorter than description calls for, on fennel seed from India on December 9, 1937, at New York; Helicosporium sp., first interception of genus, on Cedrus deodara seed from Italy on January 4 at New York; Microdiplodia wistariae Grove on wisteria from Japan at Seattle on December 28, 1937, and at San Francisco on March 25; Ovularia obliqua (Cooke) Oud., first interception, on Rumex sp. from Mexico on November 22, 1937, at San Ysidro; Peridermium sp. on Pinus halepensis needles from Italy on May 27 at New York; Pestalozzia bicolor E. & E., first interception, on February 15 at New York on willow ties from Argentina; Pestalozzia sp., no species described on the host genus, on Limonium sp. from South Africa on December 18, 1937, at New York; Phoma sp. on Eugenia holtzii seed from Australia on May 20 at New York; a disease of rose stems from Yugoslavia tentatively determined as Phomopsis incarcerata v. Hoeh. on April 19 at New York; P. magnoliicola (Syd.) Died., first interception, on magnolia from Japan on March 25 at San Francisco; Phyllosticta sp., no species reported on host, on Schizocodon macrophyllum from Japan on March 23 at San Francisco; Puccinia pimpinellae (Str.) Mart., first interception, on anise from Mexico on January 22 at Brownsville; P. urbaniana P. Henn. on Valerianodes jamaicense from Puerto Rico on May 26 at New York; Sclerotium sp. on Lycoris sp. from Japan on April 6 at San Francisco; Sclerotium sp., unlike anything reported on host, on Camellia japonica from Japan on May 11 at San Francisco; Sclerotium sp. on pyrethrum seeds from England on April 14 at Philadelphia; Septoria drummondi E. & E. on Phlox drummondi from Bermuda on May 11 at New York; Sphaceloma sp. on lemon from South Africa on May 3 at New York; Trematosphaeria cactorum Earle, first interception of genus, on Echinocactus macrodiscus from Mexico on April 29 at San Francisco; Uredo sp., no rust reported for host genus, on Maxillaria sp. from Venezuela on March 29 at San Francisco; Uromyces commelinae (Speg.) Cooke, first interception, on Tradescantia fluminensis from Mexico on April 23 at Brownsville, the host not listed under this rust in Arthur's manual; a rust, perhaps the aecial stage of Uromyces limonii (DC.) Lev., on statice leaves from South Africa on December 18, 1937, at New

York; Ustilago sp., unlike any smut reported on seeds of host genus, on seeds of Phalaris canariensis from Morocco on February 10 at Philadelphia.

DOMESTIC PLANT QUARANTINES

Grasshopper poisoning.--Baiting operations are under way in Arizona, Arkansas, California, Colorado, Iowa, Kansas, Missouri, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wisconsin. Good results have been reported from baiting even though the weather conditions are not favorable. Materials have been shipped and mixing stations established in Illinois, Michigan, Minnesota, Montana, Nebraska, Nevada, Oregon, Utah, Washington, and Wyoming. The activities are conducted jointly by Federal, State, county, and community agencies. Grower cooperation is good. The wide publicity which has been given the program in a practical and comprehensive manner by the various States, counties, and county agents has strengthened the activities of the campaign. Mixing stations for the areas in Colorado where the insects are migrating are operating nearly 24 hours a day. Iowa State workers are establishing some large central mixing plants which may represent a progressive step in the economic handling of bait materials. In New Mexico it is estimated that 300 mechanical bait spreaders will be in use to meet the heavy infestations in that State. Cool weather and showers have delayed the hatching of grasshopper eggs in several areas in northern affected States. This prolonged period of hatching has made it necessary to bait several times to obtain the utmost efficiency in baiting operations. Additional bait materials will be required in many areas for protection of crops, according to recent surveys. The additional supervisors employed in the different States are advising county and State leaders on the status of grasshoppers locally and on timely control procedures. From 30 to more than 65 percent of the bait materials needed, as estimated by the survey during the fall of 1937, have been delivered to counties in the infested States.

Grasshopper development spasmodic.--In the Texas Panhandle the hatch was completed in May and nymphs numbered up to 2,000 per square yard in bands migrating at the rate of 100 to 150 yards daily. This area is of first concern in Texas, and general poisoning was under way by the middle of May. By the latter part of the month about 300 mechanical spreaders were in operation. Because of prolonged hatching in the Panhandle area, all instars, including adults, are present. The first adult Dissosteira longipennis Thos. was found in Childress County, Tex., on May 31, the earliest recorded adult of this species in the Southwest. Extending from Texas northward, the period of hatching has been prolonged. By the end of May, fourth and fifth instars of two very common species were present in North Dakota and hatching was only 25 percent complete in the central counties. Severe weather in eastern Wyoming reduced the hopper population from 3 to 25 percent, with a reduction of 60 percent in one locality. Some areas showed destruction of egg pods by predators and parasites but the part played by these natural enemies has not reduced the need for baiting.

Mormon Cricket Control

Surveys to determine the extent of cricket damage, including observations on range lands, were made in May in the Northwestern States. With the aid of the Forest Service, several plots were laid out to determine the various range plants which are hosts of the cricket. Field men throughout the infested States are reporting the various species of plants on which the crickets are found to feed and are making observations as to birds and small animals that feed on the crickets. Claude Wakeland, on a recent field survey of conditions and status of progress of control in the infested region, reported on work in various States as follows:

Idaho.--Seven counties in which control operations are under way were visited and the observations show that crops are being protected. Alfalfa and wheat fields have been entirely protected by dusting the advancing crickets nearing cultivated areas, killing countless numbers and turning the bands back. The oiling of ditches has given very satisfactory results and is done at slight cost. Any crickets which reach irrigation lands beyond the oil barriers are readily cleaned out with hand dust guns. Farmers are enthusiastic over the results. The control of crickets in a wheatfield in Washington County by the use of a power duster has interested farmers in the purchase of power machines to be used locally. Many crops adjacent to range lands have been entirely protected by hand dusting. It was also observed that there are heavy infestations in areas not dusted in 1937 and light infestations in areas where dusting was done last year. The cricket population in one county appears to be less than one-fourth that of 1936. Destruction of seeds of many species of range grass is evident in all areas where crickets occur in numbers.

Nevada.--Heavy infestations are reported from two counties. Dusting operations are under way with 127 men working in 15 crews, including C. C. C. men and Indian labor. Good results are evident where weather conditions were suitable for carrying on the work.

Montana.--Working programs in a number of counties were put into effect and a survey made of conditions in nine counties. Hand and power dusting was in operation in three counties by the third week of May. A metal sheet barrier, approximately 8 miles long, is being erected in Yellowstone, Carbon, and Big Horn Counties. Streams and rivers in the area are being oiled. A great deal of interest is being shown in the campaign and equipment is in readiness for further operations as soon as weather conditions are suitable for effective results. The Forest Service is conducting control operations, furnishing relief labor from the C. C. C. camps to protect crop lands in the vicinity of the national forests. Field workers in Montana areas observed that crows were gorging themselves on Mormon crickets.

Oregon.--Although range lands adjacent to wheatfields in Umatilla County were found infested, the crickets were remaining in the stands of dense succulent grass the first of June. Dusting will be done in the event

the crickets bunch or the crops are threatened. A similar condition was found in Baker County. The Forest Service is active in range control work in Morrow County for the benefit of crop lands, and the Indian Service is carrying on control work on a reservation in Wasco County. Work programs have been completed for all infested counties in Oregon. Snowstorms delayed operations in Wallowa County in May.

South Dakota.--Shipments of dust and dust guns have gone forward, mixing operations started, and arrangements made to start dusting with volunteer labor on May 25. County agents and the Indian Service are cooperating.

Utah.--Practically no migration took place until the third week in May. Dusting was then begun in three counties, the Forest Service contributing to the work. Excellent kills were reported. A count 48 hours after dusting near grainfields showed a 92-percent kill and the remaining crickets so affected that the kill will approach 100 percent. The stomachs of lizards collected were found to contain Mormon crickets. Spiders were observed feeding on fourth instars and nymphs, and seven kinds of birds, including jays, larks, and robins, were seen feeding on the crickets.

Washington.--Field reports from Pasco mention an extensive band of crickets "with a several-mile front" entering a trench line on May 4, necessitating an increase in the number of trench pits and the dusting of a small area. The trench held the migration satisfactorily. It is believed the band traveled 4 to 5 miles a week. Crickets were reported to be very numerous in certain sections of Franklin County, along the Columbia River. Growers erected 6-inch metal-topped barriers in trench lines and halted the invasion of their strawberry beds, while the crews poisoned the crickets congregating against the barriers. No feeding was observed on the strawberries. Northward movement of cricket bands necessitated extensive power- and hand-dusting operations and the construction of new trenches. Southbound bands carried along and across an irrigation canal were dusted at points of entry and screened at crossings. Large flocks of seagulls on a Columbia River island were observed to feed daily on the crickets.

Wyoming.--Four counties in Wyoming were recently visited and, although weather conditions thus far have been unfavorable for general dusting operations, the counties are buying power dusters and completing barriers. Sheridan County has purchased 30 such dusters and is ready to purchase 20 more if the need arises. About 4,000 acres of crop lands in the county are being protected by 4 miles of oiled canal. The surface of the canal was found entirely covered with dead crickets which had started to migrate from range land toward the crops. Other areas in the county were dusted to protect young beets and grain.

White-fringed beetle control activities.--Control operations in the Florala, Ala., area, such as clean cultural practices on over 1,600 acres of land and removal of host vegetation along highways and fence rows, have been practically completed, well in advance of the period of peak emergence of the beetle. Among the measures employed are the use of fuel oil to keep

vegetation down on areas from which it has been removed and the use of salt along fence rows and in waste areas near buildings where the use of oil might constitute a fire hazard. Six thousand gallons of oil and two carloads of salt have been received for this purpose. Fifty turnplows are being distributed at various strategic points in readiness for quick repair of ditches which may be damaged by rains.

White-fringed beetle survey.--Arrangements are now under way for a county-by-county survey to determine possible spread of the beetle in Alabama, Florida, Georgia, Louisiana, and Mississippi, in cooperation with the States. A survey on a somewhat less intensive scale is being planned for Texas, Arkansas, Tennessee, South Carolina, and other Southern States in which the beetle is not known to exist. The survey in the latter group of State will cover railroad and other rights-of-way, as well as processing and manufacturing plants, and other places to which host materials have been shipped from infested States. Arrangements are also being made to obtain the cooperation of such organizations as Boy Scouts, Girl Scouts, and Future Farmers of America, and of vocational agricultural students, in scouting for the beetle in the known infested States.

White-fringed beetle exhibit.--At the recent entomological meeting at Baton Rouge, La., an exhibit showing damage to various types of products attracted considerable attention of entomologists, as well as several visitors to the Capitol. At the request of the Louisiana State entomologist, the exhibit was left at the building for several days in order that it might be available for observation by State senators and representatives and others interested.

Peach mosaic found in two more counties.--Peach mosaic has been reported from Woods County, Okla., by a State officer, and the disease was also found in Utah County, Utah, each finding representing a new locality of infection, the latter within a large peach-growing area. The cooperative inspection of the greater percentage of the peach trees throughout the State is approaching completion, including 180,000 trees in Utah County.

Peach mosaic on the increase in Colorado.--A survey in the Palisade and Vineland districts of Mesa County, Colo., has been completed and more diseased trees were found than in 1937. Some orchards in the heavily infected areas have been inspected as many as four times and a greater number of mosaic trees was found on the second inspection than the first. In practically all instances there was a reduction on the third and fourth inspections. The first inspection was earlier, however, than in 1937 and might be considered a prescouting as compared with last year's first survey. It is believed that trees found on the second survey had not shown symptoms on the first survey since mosaic symptons develop very rapidly and ample time had elapsed between the first and second surveys for symptoms to appear. The cold weather conditions which have prevailed in the present season have apparently been very favorable to the development of the disease. Peach growers have been kept fully advised of conditions and are in full accord with the program. Mesa County has supplied a tractor to assist relief laborers in the removal of diseased trees. Removal work has been completed on the two more heavily infected areas.

Peach mosaic reduced in California.--Properties in the infected areas where trees were removed at the time of inspection in 1937 are showing a reduction in infection this year of 25 to 35 percent, with a greater reduction in some orchards. On properties where the diseased trees were not removed at the time of inspection in 1937 there is a decided increase in the disease.

Inspection for peach diseases.--With a force of 173 men, including Federal and State inspectors, and 43 relief employees in California and Colorado trained for the work, inspection for the phony peach and peach mosaic diseases was carried on in May in Alabama, Arizona, Arkansas, California, Colorado, Georgia, Indiana, Mississippi, Missouri, New Mexico, Tennessee, Texas, and Utah. Tree-removal work is under way in 11 States.

Sweetpotato weevil control activities.--During the month (May) 11 Federal and 15 State inspectors continued activities in Alabama, Georgia, Mississippi, and Texas. Of the 11,200 properties inspected in these 4 States since the work was begun last July, over 500, or 4.5 percent, have been found infested. Inspections have also been made in the heavily infested areas of Louisiana. Activities for the month consisted principally of inspecting old infested fields, and these within a radius of 1/2 mile of known infestations, and removing any remaining sweetpotato growth. The recent examination of Texas fields showed few volunteer plants after repeated coverage during the winter and no additional infestations of sweetpotato weevils, indicating that any adult weevils remaining after harvest have been starved out. Systematic inspection of wild host plants in 2 Texas counties resulted in finding no weevils. Similar checking of volunteers was carried out in 6 counties in Mississippi, 2 in Alabama, and 3 in Georgia. Trapping is proving an excellent means of determining whether a field has been well cleaned. During the month 3,320 adult weevils were trapped on 244 properties. The continued informational and control work in Thomas County, Ga., is showing excellent results.

Transit-inspection activities.--Inspection conducted in April at 15 railway centers resulted in finding 536 quarantine violations en route to 42 States, Canada, and Alaska. There were approximately 12 percent more violations than were found in April 1937.

Interceptions of interest.--A recent interception at Pittsburgh is mentioned as illustrating thoroughness of transit inspection: A package consigned to a tool company in Detroit had the appearance and weight of metals but as it did not have a metallic sound when shaken, it was opened and found to contain uncertified strawberry plants with soil from the Japanese beetle area. Inspectors in the Boston area report the interception of several violations in shipments bearing such labels as "Cut flowers," "Greenhouse-grown," or "Herbaceous plants-No inspection required." On inspection, several such packages were found to contain cuttings of evergreen or pussy willow from the gypsy moth area, or plants in soil from the Japanese beetle area. Shipments bearing Japanese beetle "A" certificates shipped by classified dealers were found lacking as to gypsy moth certificates. One hundred and eighty packages of perennials from a shipper in the Japanese

beetle area were intercepted by the transit inspector at the Hoboken, N. J., mail terminal on May 26 for lack of beetle certificates. The shipments bore the return address of a Chicago mail-order house but were postmarked at a point in New Jersey and the entire lot of eight mail sacks was turned back to the office of mailing. Some 500 to 1,000 dozens of plants were involved. Investigation on the part of the Japanese beetle field office showed the contents had been certified and the certificates omitted.

Citrus canker eradication.--Efforts have been concentrated during the last 2 months on the elimination from former infected properties of every seedling that may have originated on properties on which canker had formerly been found. All properties that have been found infected with citrus canker in the Texas noncommercial area since 1934 have been re-inspected during the last 60 days and the infected spots burned with pear burners. The second round of inspection on those properties has now begun. No canker was found in May. Inspections were made with a force of nine Federal and State inspectors in the counties of Brazoria, Galveston, Harris, Jefferson, and Matagordo. All areas within a mile of formerly infected properties were "walked out" in formation by the eradication crews to find and destroy all escaped host trees. In May 57 relief laborers destroyed 184,000 citrus trees on 200 properties.

Terminal inspection activities increased.--The State of Arkansas has arranged for terminal inspection of sweetpotatoes and sweetpotato plants at Little Rock for the enforcement of its sweetpotato weevil quarantine. Under this arrangement provision is made for postmasters to refuse delivery or mailing of such consignments from any part of the continental United States unless accompanied by a State certificate. Provision has been made by the State of California for the terminal inspection of plants and plant products at 14 additional points in that State.

Blister-rust regulations revised.--The white-pine blister rust quarantine regulations were revised on June 1, effective July 1. The present requirements are designed to protect two pine-growing regions in which the blister rust has not been found, one comprising the Southeastern States of Georgia, Kentucky, North Carolina, South Carolina, and Tennessee and the other region the Southwestern States of Arizona, Colorado, Nevada, New Mexico, Utah, Wyoming, and part of California. Five-leafed pines are prohibited movement into these States (except between and among them) and Ribes shipments thereto are required to be dipped or dormant and defoliated. Control work in other regions is protected through the control-area permit requirement in shipping currant and gooseberry plants into 23 States. The former embargo on European black currant shipments is continued.

CONTROL INVESTIGATIONS

Photographic technique to determine knock-down effect of insecticides.--W. N. Sullivan, E. R. McGovran, and G. L. Phillips, of the Beltsville, Md., laboratory, report the development of a photographic technique to determine knock-down effect of insecticides, as well as the mortality of the insects when tested on the Campbell metal turntable. By this method flies

in screen-covered Petri dishes, 145 mm in diameter and 52 mm deep, are placed in the cage holders under the spray chambers, the cylinders are filled with a spray of sufficient concentration, and the flies exposed to the falling mist. Artificial light entering the cylinder from above is diffused by the spray droplets so that it forms a good background for the taking of silhouette pictures of the paralyzed flies at various time intervals during the test by means of a camera focused on the bottom of the dish. All flies except those on the bottom of the Petri dish are out of the narrow range of the sharp focus used (f.4.5) and any movement of the flies on the bottom of the dish causes a blurred image on the negative (1-second exposure period). Approximately 15 minutes is required for spraying and photographing a series of five tests. This technique could be applied to tests using a single chamber constructed along the same lines.

Pyrethrin I and pyrethrin II differ in knock-down effect and kill.--Messrs. Sullivan, McGovran, and Phillips and H. L. Haller, of the Division of Insecticide Investigations, report that tests of the knock-down and the subsequent mortality of houseflies by fly sprays high in pyrethrins I and II showed that under the conditions of the tests pyrethrin I caused a higher mortality than did pyrethrin II, although the latter was much superior in its knock-down effect. For the purposes of these tests the photographic method described above was utilized.

INSECTICIDE INVESTIGATIONS

Improved methods for determination of arsenic.--The Gutzeit method for arsenic, which is used as an official method by the Association of Official Agricultural Chemists, has an inherent error of 5 to 10 percent. In an effort to find more accurate methods three procedures were studied during 1937 by C. C. Cassil, referee on arsenic for the Association of Official Agricultural Chemists. A report of Mr. Cassil's work was made at the November 1937 meeting of this Association and this report has just been published in the Journal of the Association of Official Agricultural Chemists (vol. 21, no. 2, pp. 198-203, May 1938).

Determination of small quantities of antimony in tartar emetic spray residues.--Tartar emetic mixed with a dilute solution of sugar or molasses has been used as a spray to control fruitflies attacking citrus trees. A method of determining antimony residues has been published by J. Davidson and G. N. Pulley, of the Bureau of Chemistry and Soils, and C. C. Cassil, of the Division of Insecticide Investigations (Jour. Assoc. Off. Agr. Chemists vol. 21, no. 2, pp. 314-318, May 1938). The antimony is determined by a procedure similar to that used in the Gutzeit method for arsenic.

Derris residues on cabbage.--A study has just been completed concerning the amount of derris left on cabbages at the time of harvesting. C. C. Cassil went to the truck-crop experiment station at Charleston, S. C., and analyzed cabbages, both U. S. No. 1 and U. S. No. 1 Green, that had been treated with five applications of a derris-plus-clay mixture containing 1 percent rotenone, the applications having been made at 7-day intervals. It was found that, whereas 1 such dusting applied about 23 parts per million, the series of 5 dustings resulted in an accumulation of only 36 parts per million.

An opportune shower gave the chance to demonstrate that nearly 90 percent of the residue was removed by 0.6 inch of rain. These analyses were made by means of a colorimetric test for rotenone, developed in this Division and described briefly in a previous issue. The results have been prepared for publication.

Review of organic insecticides.--F. B. LaForge and L. N. Markwood contributed a chapter on organic insecticides to the Annual Review of Biochemistry (vol. 7), which covers progress in that field for the year 1937. The following insecticides are discussed: Compounds of the rotenone group, the pyrethrins, quassin, and nicotine and related compounds.

Fine phenothiazine more toxic than coarse.--A cooperative project between the Division of Insecticide Investigations and the Division of Fruit Insect Investigations on the study of the variation of toxicity to codling moth larvae with particle size of different insecticides has revealed some interesting results in the case of phenothiazine. A commercial sample was separated by L. D. Goodhue in a Federal air classifier. The coarse (about 50-70 microns in diameter) and a fine fraction (below 10 microns) were submitted to E. H. Siegler for tests against codling moth larva. Using 123 plugs, the coarse fraction allowed 63 percent entries and 2 percent stings. The fine fraction on 141 plugs allowed only 10 percent entries and 2 percent stings. The load deposited on the plugs and the chemical composition was found to be almost identical, according to the analyses by C. C. Cassil. Further evidence of the identical chemical composition of the coarse and fine samples was obtained when each was dissolved in alcohol, re-precipitated and tested for toxicity in the same way. Treated in this way, the toxicological results were practically the same for both samples.

BEE CULTURE

Field laboratory established in North Central States.--In April the new laboratory of the Division at Madison, Wis., was opened. It will be known as the North Central States Bee Culture Field Laboratory, and its immediate problems have to do largely with the studies on supersedure and package bees. In connection with the opening of this laboratory, the following statement was prepared for publication in the various bee journals of the country: The Bureau of Entomology and Plant Quarantine has recently concluded a memorandum of understanding with the Wisconsin Agricultural Experiment Station which will provide facilities at Madison for work on bee culture, particularly those phases of the work in the North Central States concerned with problems on supersedure and package bees. In addition to studies on these special problems, the Bureau will cooperate with the Wisconsin Agricultural Experiment Station in the study of beekeeping problems peculiar to the State and will also cooperate with the University in planning various work on beekeeping, including teaching. Under this arrangement the station will provide facilities so that the Bureau can make use of the package bees and queens, hives, and other apiary equipment offered through the agencies of the American Honey Producers' League. The American Honey Producers' League, through a special committee of which W. E. Anderson, State Entomologist, Baton Rouge, La., is chairman, offered to obtain without cost to the Government up to 500 colonies of package bees and necessary apiary

equipment to be used in connection with investigations on beekeeping problems, particularly those related to package bees and queens." C. L. Farrar, of the Intermountain States Bee Culture Laboratory at Laramie, Wyo., has been transferred to Madison to be in charge of the work of the Bureau at this new laboratory. He will also be responsible for carrying out the cooperative arrangements with the Wisconsin Agricultural Experiment Station and the College of Agriculture of the University of Wisconsin.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Identification work on white-fringed beetle conducted at Gulfport, Miss.--In order to expedite identification reports in connection with the extensive survey to determine the distribution of the white-fringed beetle in the Southern States, R. E. Blackwelder has been appointed to handle this phase of the identification work and has been stationed at Gulfport, Miss. J. M. Roberts, of the Department of Entomology at the University of Louisiana, is associated with Mr. Blackwelder in this undertaking.

New United States record for a species of Noctuidae.--In material submitted for determination by Rollin H. Baker, of College Station, Tex., was one specimen from Brewster County, Tex., determined by J. F. Gates Clarke as Tarachidia heonix Dyar, a species of Noctuidae. This is the first specimen of this species recorded from the United States. In addition to the above specimen, there are in the National Museum the type and two other specimens, all from Mexico.

Identity established for lepidopterous larva in shipments from Mexico.--A moth reared at Laredo, Tex., from larvae in green string beans from Mexico has been determined by Carl Heinrich as Epinotia opposita Heinrich (family Olethreutidae). This species was described from moths reared from alfalfa and cowpeas at Lima, Peru. Specimens have also been received from Guatemala, Costa Rica, and Argentina, those from the last-named country reared from Vicia faba. The species is evidently of considerable economic importance for the larvae have been frequently intercepted in shipments of green beans and peppers from Mexico. Hitherto these larvae had not been associated with adults and were determined merely as a species of Olethreutidae. The species is not known to occur in the United States.

Notes on Ants

Ants determined by M. R. Smith as Pheidole morrisi Forel were found by A. L. Brody, of the Division of Insects Affecting Man and Animals, attacking and killing larvae of the secondary screwworm fly (Cochliomyia macellaria (F.)) at Valdosta, Ga.

A. C. Burrill, Curator of the Missouri Resources Museum, submitted for determination specimens of the legionary ant (Eciton (Acamatus) schmitti Emery), found clustering on the wall of a basement at Cedar City, Mo. According to Burrill, "there was a knot of ants on the side of the basement wall as big as your hat." This species is known to be predatory on termites and other ants.

On June 4, M. R. Smith captured a braconid wasp which was attempting to oviposit in the gaster of an ant, Formica fusca var. subsericea Say, on a nest at Washington, D. C. The parasite was determined by C. F. W. Muesebeck as Elasmosoma pergandei (Ashm.). Species of this genus are known to attack ants, but are rarely encountered.

J. C. Bridwell found the small ptiliid beetle Limulodes paradoxus Matthews in the nest of an ant, Lasius (Acanthomyops) interjectus Mayr, at Vienna, Va. This appears to be a new specific host record for this myrmecophilous beetle.

Mealybug intercepted on cipollini bulbs now described.--Since 1932 there have been received from time to time from the New York and Philadelphia port-inspection groups of the Division of Foreign Plant Quarantines, specimens of a curious mealybug collected on bulbs of cipollini (Muscari comosum), coming into this country from Morocco. It is now possible to provide these insects with a name since Dr. A. Balachowsky, in France, has described the form as Bouhelia maroccana, new genus and new species. The insect is so distinctive that it could be immediately recognized from the Balachowsky description.

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